

Study of the neutron irradiation effect on SiPM based 10-channel prototype of scintillation detector module

Tuesday, 13 December 2016 08:00 (30 minutes)

The detectors based on solid-state photomultipliers (SiPM) are proposed for forthcoming experiments planned with relativistic heavy ions and material studies at FAIR and at NICA. We have investigated SiPM based 10-channel prototype of scintillation detector module produced at JINR by irradiating it with quasi-monoenergetic neutrons of peak energy 32 MeV and fluence $\sim 3 \cdot 10^{11}$ n/cm². Secondary neutron beam was produced in the ⁷Li(p,n)⁷Be neutron generator at the NPI cyclotron (Rez, Czech Republic). It is shown that the module electronics remains operational, but the noise of SiPM increased. We applied new method to monitor changes in the breakdown voltage without measurement of SiPMs I-V characteristics. The method is based on measurement of the dependence of V_{pp} and V_{rms} voltage on the bias voltage. The proposed method can be applied for monitoring of changes in the breakdown voltage during the detector operation and does not require the usage of the additional equipment.

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Session Classification: Session of ion irradiation of materials